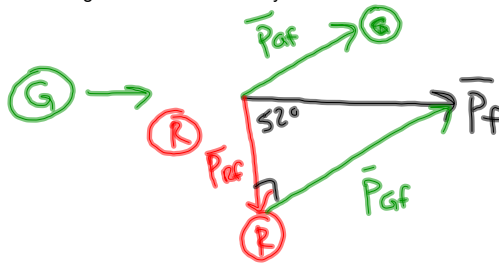


Quarter Exam Review 3.20.12 Honors Physics

A green 3.00 kg ball moving 12.0 m/s hits a non-moving 2.00 kg red ball. After they hit, the red ball is moving to the right at a 52 degree angle from the green ball's original direction. The green ball is now moving at a 38 degree angle to the left of its original direction.

- What is the red ball's final momentum?
- What is the green ball's final velocity?

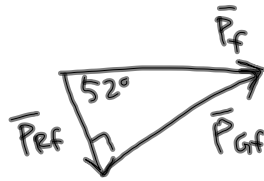


$$\bar{P}_i = \bar{P}_f$$

$$\bar{P}_{Gi} + \bar{P}_{Ri} = \bar{P}_{Gf} + \bar{P}_{Rf}$$

*these are vectors,
so we have to
use a triangle to add*

$$P_f = P_i = P_{Gi} = 36 \text{ kg}\cdot\text{m/s}$$



$$\begin{aligned} \text{a) } P_{Rf} &= ? & \cos(52^\circ) &= \frac{P_{Rf}}{P_f} \\ P_{Rf} &= P_f \cos(52^\circ) \\ &= 22.16 \text{ kg}\cdot\text{m/s} \end{aligned}$$

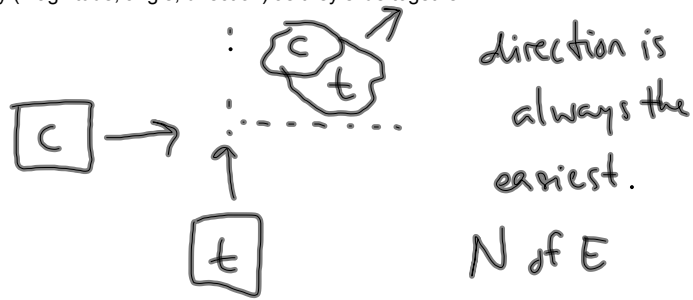
$$\text{b) } v_{Gf} = ?$$

$$\begin{aligned} P_{Gf} &= P_f \sin(52^\circ) \\ &= 28.37 \text{ kg}\cdot\text{m/s} \end{aligned}$$

$$v_{Gf} = \frac{P_{Gf}}{m_G} = 9.46 \text{ m/s}$$

Quarter Exam Review 3.20.12 Honors Physics

A truck is traveling north at 35 m/s and has a mass of 3000 kg. A car is traveling east at 30 m/s and has a mass of 2000 kg. If they collide and stick together, find the final velocity (magnitude, angle, direction) as they slide together.



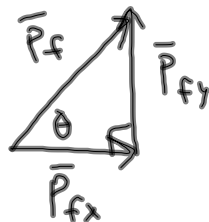
$$\vec{p}_{ix} = \vec{p}_{cix} + \vec{p}_{tix} = m_c \vec{v}_{cix} = 60000 \text{ kg}\cdot\text{m/s}$$

$$\vec{p}_{iy} = \vec{p}_{ciy} + \vec{p}_{tiy} = m_t \vec{v}_{tiy} = 105000 \text{ kg}\cdot\text{m/s}$$

from cons. of momentum:

$$\vec{p}_{fx} = \vec{p}_{ix} = 60000 \text{ kg}\cdot\text{m/s}$$

$$\vec{p}_{fy} = \vec{p}_{iy} = 105000 \text{ kg}\cdot\text{m/s}$$



Pythag. thm. to find magnitude of p_f

$$p_f = 120933 \text{ kg}\cdot\text{m/s}$$

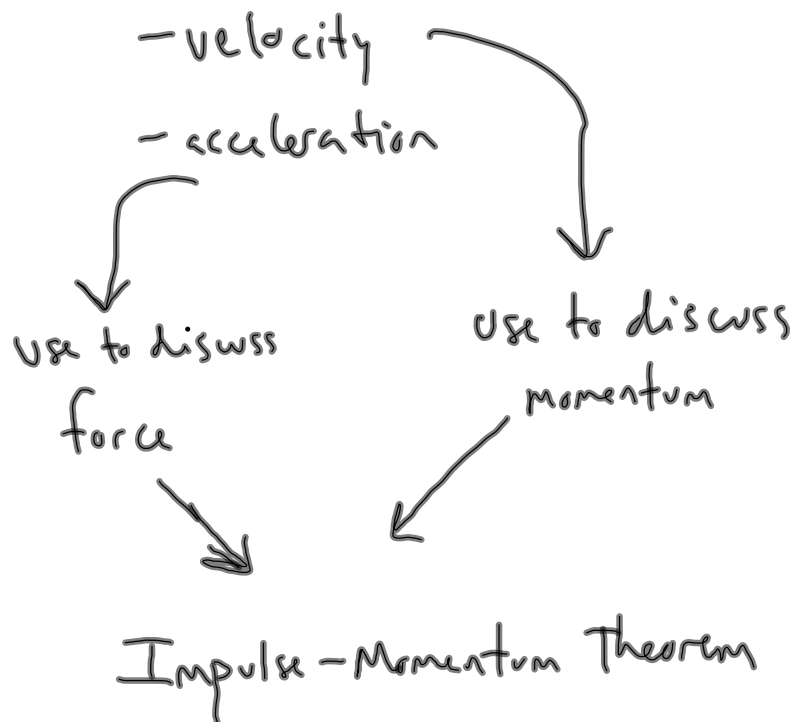
$$\theta = \tan^{-1}\left(\frac{p_{fy}}{p_{fx}}\right) = 60.3^\circ$$

$$p_f = (m_c + m_t) v_f$$

$$v_f = \frac{p_f}{m_c + m_t} = 24.9 \text{ m/s}$$

Motion of objects:

- How we define motion
 - We need time and how far it goes for a given time
- Looked at graphs of motion
 - Displacement v. time
 - Velocity v. time
 - Acceleration v. time
- More quantities of motion:



- Momentum :
 - conservation between initial and final
 - We can use this to predict an outcome of a collision
 - Major collision types:
 - elastic
 - inelastic (2 sub-types)
- Forces :
 - Many different types
 - Newton's laws
 - related to acceleration, so two different cases
 - equilibrium
 - non-equilibrium
 - Major diff. bet. momentum and force is that if obj. not in motion, there is no momentum. But, there can still be forces acting on obj.
- Motion can happen (for us) in 1- or 2-Dimensions
 - If in 2-D, we have to use vectors
 - Use triangles to add and/or figure out variables